**Joseph Banks Secondary College**

Year 12 Integrated Science: General

**NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**TASK 7: TEST – Chemical reactions, combustion, corrosion, petrol and batteries.**

**Time allowed for this paper**

Reading time: 5 minutes

Working time for paper: 55 minutes

**Materials required/recommended for this paper**

***To be provided by the supervisor***

This Question/Answer Booklet

Periodic Table

***To be provided by the candidate***

Standard items: pens, pencils (including coloured), sharpener, correction fluid, eraser, ruler, highlighters.

**Task Weighting:**

7.5% of the school mark for this pair of units

**Structure of this paper**

|  |  |  |
| --- | --- | --- |
| **Section** | **Number of questions** | **Marks available** |
| **A**: Multiple choice | 15 | /15 |
| **B**: Short answer | 3 | /27 |
| **C:** Extended response | 1 | /18 |
| **Total** |  | **/60**  **%** |

**Section A: Multiple choice [15 marks]**

**Each question has only one correct answer. Circle the appropriate box to record your answer.**

1. Which of the following is an example of a physical change?
2. A gas being produced when a metal is added to an acid
3. Salt crystals dissolving in water
4. A solid forming when two solutions are added together
5. A temperature increase when a metal is added to water
6. During an acid-metal reaction, the products formed from this reaction are:
7. Carbon Dioxide and Water
8. Metal Salt and Carbon Dioxide
9. Metal Salt and Hydrogen Gas
10. Carbon Dioxide and Hydrogen Gas

1. Which of the following is not a common property of metals?
2. Malleable
3. Dull
4. Ductile
5. Good conductor of heat

1. A composite material is best described as a:
2. combination of materials with different physical properties
3. combination of a solute and solvent
4. mixture of substances
5. combination of two materials with different physical and chemical properties
6. Which of the following are products of a complete combustion reaction?
7. Carbon Dioxide and Carbon Monoxide
8. Carbon Dioxide and Water
9. Water and Carbon Monoxide
10. Oxygen and Carbon Dioxide
11. Which of the following is the balanced chemical reaction for the combustion of Butane?
12. 2C4H10. + 13O2. 🡪 8CO2 + 10H2O
13. 3C4H10. + 11O2. 🡪 12CO2 + 9H2O
14. C4H10. + O2. 🡪 CO2 + H2O
15. 2C4H10. + 12O2. 🡪 7CO2 + 10H2O
16. What is the correct formula for Octane?
17. CH4
18. C18H24
19. NH4H
20. C8H18
21. Which is NOT a sign of a chemical change?
22. Gas production
23. Heat production
24. Dissolving
25. Colour change
26. A solute is:
27. Dissolved in the solvent
28. Used to dissolve a solvent
29. The major component of a mixture
30. Always heterogenous
31. An example of a composite material is:
32. A gold ring
33. Kevlar
34. Sodium Chloride
35. Steel
36. Which of the following are products of an incomplete combustion reaction?
37. Carbon Dioxide and Carbon Monoxide
38. Carbon Dioxide, Water and Carbon
39. Water, Carbon Monoxide and Carbon
40. Oxygen and Carbon Dioxide and Carbon
41. In a car battery the cathode and the anode are what charge.

|  |  |  |
| --- | --- | --- |
|  | CATHODE | ANODE |
| **a)** | Negative | Positive |
| **b)** | Negative | Neutral |
| **c)** | Neutral | Positive |
| **d)** | Positive | Negative |

1. What is the acid that is commonly used in car batteries?
2. Hydrochloric acid
3. Nitric acid
4. Sulfuric acid
5. Citric acid
6. What are the main properties of Carbon Fibre for its requirement in cars?
7. Strong and corrosion resistant
8. Strong, light weight and corrosion resistant
9. Light weight and strong
10. Rigid and conductive.
11. Steel is used in cars for its corrosion resistance, what is the name of this material?
12. Metal
13. Composite
14. Iron
15. Alloy

**Section B: Short answer [27 marks]**

1. **Physical and Chemical Change (9 marks)**
   1. List and explain one example of a physical change. *(2 marks)*

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* 1. Provide three indicators for a chemical change? *(3 marks)*

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* 1. 2.5 g of a white powder was in a crucible. It was heated with a Bunsen burner until a liquid was formed. After cooling a piece of white solid remained. It weighed 2.0 g. Explain whether this is a physical or chemical change. Give a reason for your answer.  *(4 marks)*

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1. Alloy Materials **(8 marks)**
   1. Define an alloy and provide an example. *(2 marks)*

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* 1. For the alloy material you named above in a), provide the composition, a use of this alloy. *(2 marks)*

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* 1. List and describe three properties of this material and explain why it is used in the product you have listed above.  *(4 marks)*

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1. Word Equations and Types of Reactions **(10 marks)**

**For questions a) and b) below provide the word and formula equation and identify the type of reaction for each.**

* 1. Zinc (Zn) and Hydrochloric acid (HCl) react to form zinc chloride (ZnCl2) and hydrogen (H2). *(3 marks)*

Word Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formula Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type of Reaction:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Calcium hydroxide (Ca(OH)2) and sulfuric acid (H2SO4) react to form calcium sulfate (CaSO4) and water (H2O). *(3 marks)*

Word Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formula Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type of Reaction:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**For questions c) below, supply the missing chemicals, identify the type of reaction and write down the generic equation for each type of reaction.** *(4 marks)*



Magnesium carbonate + Sulfuric acid =>  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ +  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + Water

Type of Reaction:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Generic Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section C: Extended Answer [18 marks]**

1. Second hand data analysis of Fuel- <https://afdc.energy.gov/data/>
   1. Provide the labels missing in the table. *(2 marks)*

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| **Title: Clean Cities Energy Use Impact by Fuel Type (million GGEs)** | | | | | | | | | | | | | | | |
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| **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** |
| CNG | 89 | 56 | 81 | 102 | 104 | 85 | 141 | 167 | 191 | 231 | 293 | 402 | 430 | 426 | 411 |
| Biodiesel | 21 | 47 | 63 | 61 | 74 | 39 | 29 | 70 | 59 | 61 | 59 | 78 | 102 | 94 | 116 |
| E85 | 16 | 26 | 45 | 37 | 37 | 73 | 39 | 49 | 38 | 48 | 51 | 68 | 71 | 86 | 71 |
| LNG | 0 | 8 | 16 | 9 | 14 | 12 | 23 | 28 | 21 | 22 | 34 | 53 | 45 | 47 | 52 |
| Propane | 39 | 32 | 42 | 30 | 25 | 18 | 18 | 19 | 27 | 27 | 32 | 37 | 45 | 44 | 52 |
| Electric | 3 | 2 | 5 | 5 | 4 | 29 | 9 | 16 | 12 | 20 | 27 | 33 | 41 | 26 | 45 |

**Acronyms:**

|  |
| --- |
| CNG: Compressed natural gas |
| E85: 85% ethanol, 15% gasoline |
| LNG: Liquefied natural gas |

GGEs= gasoline gallon equivalents

* 1. Provide the following variables from the table above: *(4 marks)*

Independent Variable:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Dependent Variable:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* 1. Provide one controlled variable that must have been followed for the data above to be collected and explain why they need to be controlled. *(2 marks)*

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* 1. Create an appropriate graph to represent the data in the table above. Only include electric and Biodiesel in the graph. *(6 marks)*

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1. Using the graph above describe the trends observed and provide an explanation for the results.

*(4 marks)*

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**END OF TEST**